Active Project (2014 - 2016)

Automated High-Volume Manufacturing of Modular Photovoltaic Panel Assemblies for Space Solar Arrays, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

ABSTRACT

Deployable Space Systems, Inc. (DSS) will focus the proposed SBIR Phase 2 program on the development and demonstration of an automated robotic manufacturing infrastructure designed to mass-produce DSS's Integrated Modular Blanket Assembly (IMBA) common photovoltaic Standard Power Modules (SPM's). The proposed development and demonstration will implement automated manufacturing processes for CIC-ing, glassing, stringing, laydown, and validation testing of interconnected photovoltaic devices onto an ultra-lightweight IMBA/SPM modular flexible blanket assembly through simple and commercially available pick-and-place robotic manufacturing techniques / equipment. Robotically automated manufacturing of IMBA/SPM photovoltaic panel assemblies will provide game-changing affordability / cost-savings when compared to current labor intensive manufacturing processes. Unlike the current industry approach which is only focused on increasing the device area to only minimally reduce panel assembly costs, the proposed automated manufacturing will attack the highest/most labor intensive cost components of manufacturing a panel assembly, namely; CICing, glassing, stringing, panel laydown, and validation testing. DSS's modular IMBA/SPM photovoltaic flexible blanket assembly coupled with automated manufacturing promises to provide ultra-affordable, high-performance, and repeatable high-quality photovoltaic panel assemblies for future NASA Space Science and Exploration missions, and particularly for ultra-high-power SEP missions.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: NASA space applications are comprised of practically all Exploration, Space Science, Earth Science, Planetary Surface, and other missions that require high-efficiency photovoltaic power production

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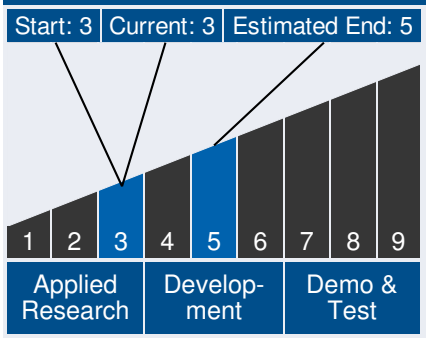
Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

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through affordable solar arrays. The technology is particularly suited for NASA's SEP missions and other missions that require game-changing performance in terms of extremely large deployed areas, affordability, ultra-lightweight, and compact stowage volume. The technology is also well suited for applications requiring scalability/modularity, operability within high radiation environments, high voltage operation, and LILT/HIHT operation. The proposed technology is estimated to ultimately reduce standard photovoltaic panel assembly costs by an astounding 49% for space applications.

To the commercial space industry:

Potential Non-NASA Commercial Applications: Non-NASA space applications are comprised of practically all missions that require high-efficiency photovoltaic power production through affordable solar arrays. The technology is particularly suited for SEP missions that require game-changing performance in terms of large deployed areas, affordability, ultra-lightweight, and compact stowage volume. Applicable non-NASA space missions include: LEO surveillance, reconnaissance, communications and other critical payload/equipment satellites, LEO commercial mapping and critical payload/equipment satellites, MEO satellites & space-tugs, GEO commercial communications and critical payload/equipment satellites, and GEO communications and payload/equipment satellites. The proposed technology also has tremendous dual-use non-space commercial private-sector applicability including fixed-ground and deployable/retractable mobile-ground based systems whereby such automation allows commercial affordability. The proposed technology is estimated to ultimately reduce standard photovoltaic panel assembly costs by an astounding 49% for space applications.

Management Team *(cont.)*

Program Manager:
- Carlos Torrez

Project Manager:
- Michael Piszczor

Principal Investigator:
- Brian Spence

Technology Areas

Primary Technology Area:
Materials, Structures, Mechanical Systems and Manufacturing (TA 12)
- Manufacturing (TA 12.4)
  - Electronics and Optics Manufacturing Process (TA 12.4.3)
    - Photovoltaic Solar Cell Manufacturing (TA 12.4.3.1)

Secondary Technology Area:
Space Power and Energy Storage (TA 3)
- Power Generation (TA 3.1)
  - Solar (TA 3.1.3)

Additional Technology Areas:
Materials, Structures, Mechanical Systems and Manufacturing (TA 12)
- Manufacturing (TA 12.4)

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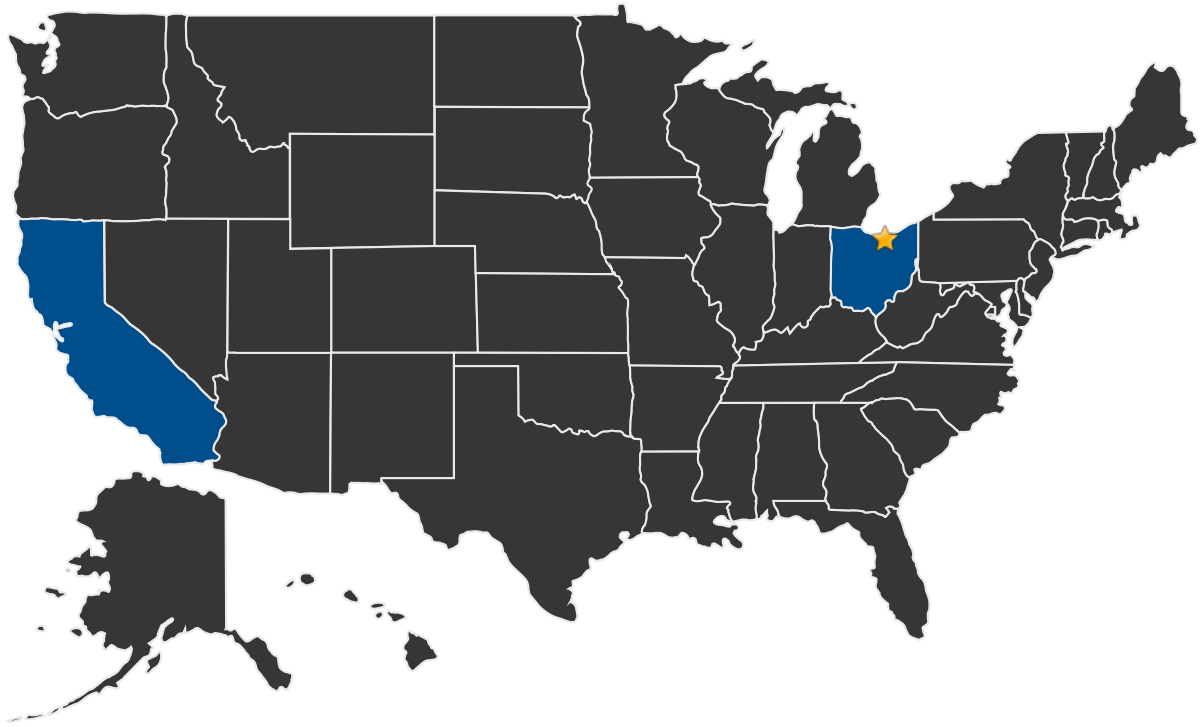
U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

Lead Center:
Glenn Research Center

Other Organizations Performing Work:

- Deployable Space Systems, Inc. (Goleta, CA)

PROJECT LIBRARY

Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/23083)

Automated High-Volume Manufacturing of Modular Photovoltaic Panel Assemblies for Space Solar Arrays, Phase II Project

IMAGE GALLERY

Automated High-Volume Manufacturing of Modular Photovoltaic Panel Assemblies for Space Solar Arrays, Phase II

DETAILS FOR TECHNOLOGY 1

Technology Title

Automated High-Volume Manufacturing of Modular Photovoltaic Panel Assemblies for Space Solar Arrays

Potential Applications

NASA space applications are comprised of practically all Exploration, Space Science, Earth Science, Planetary Surface, and other missions that require high-efficiency photovoltaic power production through affordable solar arrays. The technology is particularly suited for NASA's SEP missions and other missions that require game-changing performance in terms of extremely large deployed areas, affordability, ultra-lightweight, and compact stowage volume. The technology is also well suited for applications requiring scalability/modularity, operability within high radiation environments, high voltage operation, and LILT/HIHT operation. The proposed technology is estimated to ultimately reduce standard photovoltaic panel assembly costs by an astounding 49% for space applications.